

CLAIMS

1. A method of transmission power control characterized in that oscillation in an uncompensated transmission power level corresponding to an established transmission power control command sequence is detected and the
5 established transmission power control command sequence is compensated for the oscillation in the uncompensated transmission power level, the compensation comprising injection of a compensating sequence to, or blocking of one or more frequency components of, the established transmission power control
10 command sequence.
2. The method according to claim 1 characterized in that the compensation comprises injection of a compensating sequence to the established transmission power control command sequence thereby forming a compensated transmission power
15 control command sequence.
3. The method according to claim 2 characterized in that the compensating sequence is generated in a neural network.
4. The method according to claim 3 characterized
20 in that the compensating sequence is generated by means of back-propagation.
5. The method according to claim 2 characterized in that the compensating sequence is generated by concatenating one or more pre-defined sequences.
- 25 6. The method according to claim 2 characterized in that the compensating sequence is generated by concatenating one or more pseudo-random sequences.
7. The method according to claim 2 characterized in that the compensated transmission power control is achieved

by adding modulo-2 of a compensating sequence to the established transmission power control command sequence.

8. The method according to claim 7 characterized in that the sequences' one or more components are either 0 or 1, or a multiple thereof.

9. The method according to claim 2 characterized in that the compensated transmission power control is achieved by component-wise multiplication of a compensating sequence to the established transmission power control command sequence.

10. The method according to claim 9 characterized in that the sequences' one or more components are either +1 or -1, or a multiple thereof.

11. The method according to claim 1 characterized in that the compensation comprises blocking of one or more frequency components of the established transmission power control command sequence thereby forming a compensated transmission power control command sequence.

12. The method according to claim 11 characterized in that the blocking is achieved by means of filtering.

13. The method according to claim 12 characterized in that one or more transmission power control command components representing one or more frequencies greater than the oscillation frequency of the oscillations in the corresponding transmission power level are filtered out, entirely or partially if power of frequency components above the oscillation frequency are greater than power of frequency components below, and that one or more transmission power control command components representing one or more frequencies essentially equal to the oscillation frequency are filtered out essentially entirely.

14. The method according to claim 12 c h a r a c t e r -
i z e d i n that one or more transmission power control command
components representing one or more frequencies essentially
equal to the oscillation frequency of the oscillations in the
5 corresponding transmission power level are filtered out,
essentially entirely, if power of frequency components below
the oscillation frequency are greater than power of frequency
components above.

15. The method according to claim 11 c h a r a c t e r -
10 i z e d i n that the blocking is achieved by means of canceling
frequency transform coefficients of a frequency transformed
signal.

16. The method according to claim 11 c h a r a c t e r -
i z e d i n that one or more frequency components below a
15 frequency threshold are blocked.

17. The method according to claim 16 c h a r a c t e r -
i z e d i n that one or more frequency components of energy
larger than energy of frequency content above the threshold are
blocked.

20 18. The method according to claim 16 or 17 c h a r a c t e r -
i z e d i n that the frequency threshold is set essentially
equal to the oscillation frequency.

19. The method according to any of claims 1-18 c h a r a c -
t e r i z e d i n that oscillation is detected by means of
25 frequency analysis.

20. The method according to any of claims 1-18 c h a r a c -
t e r i z e d i n that loop delay is estimated in relation
to oscillation cycle time.

21. The method according to claim 20 c h a r a c t e r -
i z e d i n that loop delay is estimated to be essentially
equal to one fourth of the cycle time.

22. The method according to any of claims 1-18 c h a r a c -
5 t e r i z e d i n that identified oscillation is compensated
until number of identical transmission power control commands
of the established transmission power control command sequence
exceeds a threshold.

23. The method according to claim 22 c h a r a c t e r -
10 i z e d i n that the threshold corresponds to essentially four
times the loop delay.

24. The method according to any of claims 1-18 c h a r a c -
t e r i z e d i n that oscillations of one or more radio links,
for which transmission power level and cell interference are
15 correlated to a greater extent than indicated by a predefined
threshold, are compensated for.

25. The method according to any of claims 1-18 c h a r a c -
t e r i z e d i n that the oscillations are compensated at
the receiver.

20 26. The method according to claim 25 c h a r a c t e r -
i z e d i n that the receiver is a radio base station, or is
included in or connected to a radio base station.

27. The method according to claim 25 c h a r a c t e r -
i z e d i n that the receiver is a mobile station, or is
25 included in or connected to a mobile station.

28. The method according to any of claims 1-18 c h a r a c -
t e r i z e d i n that the oscillations are compensated at
the transmitter.

29. The method according to claim 28 c h a r a c t e r -
i z e d i n that the transmitter compensates received re-
spective transmission power control commands of different
mobile stations adjusted for its peak transmission power
5 capacity.

30. The method according to claim 28 or 29 c h a r a c t e r -
i z e d i n that the transmitter is a radio base station, or
is included in or connected to a radio base station.

31. The method according to claim 28 c h a r a c t e r -
10 i z e d i n that the transmitter is a mobile station, or is
included in or connected to a mobile station.

32. A device of transmission power control c h a r a c -
t e r i z e d b y the device comprising an oscillation
detector and oscillation compensating means, compensating for
15 oscillations as detected in corresponding uncompensated
commanded transmission power level of one or more established
transmission power control command sequences, the compensating
means injecting a compensating sequence to, or blocking one or
more frequency components of, the established transmission
20 power control command sequence.

33. The device according to claim 32 c h a r a c t e r -
i z e d b y the compensating means comprising a processing
element performing component-wise algebraic operations on a
compensating sequence and the established transmission power
25 control command sequence thereby forming a compensated
transmission power control command sequence.

34. The device according to claim 33 c h a r a c t e r -
i z e d b y a neural network for generating the compensating
sequence.

35. The device according to claim 34 character-
i z e d b y the neural network comprising a back-propagation
arrangement.

5 36. The device according to claim 33 character-
i z e d b y means for concatenating one or more pre-defined
sequences for generating the compensating sequence.

37. The device according to claim 33 character-
i z e d b y a pseudo-random number generator generating the
compensating sequence in whole or part.

10 38. The device according to claim 33 character-
i z e d b y the processing element performing component-wise
algebraic operations being a modulo-2 adder, component-wise
adding a compensating sequence to the established transmission
power control command sequence.

15 39. The device according to claim 38 character-
i z e d i n that the added sequences' one or more components
are either 0 or 1, or a multiple thereof.

20 40. The device according to claim 33 character-
i z e d b y the processing element performing component-wise
algebraic operations being a multiplier, component-wise
multiplying a compensating sequence and the established
transmission power control command sequence.

25 41. The device according to claim 40 character-
i z e d i n that the sequences' one or more components are
either +1 or -1, or a multiple thereof.

42. The device according to claim 32 character-
i z e d b y the compensating means comprising a processing
element blocking one or more frequency components of the
established transmission power control command sequence

thereby forming a compensated transmission power control command sequence.

43. The device according to claim 42 c h a r a c t e r -
i z e d b y the compensating means comprising a processing
5 element blocking one or more frequency components being a
filter.

44. The device according to claim 43 c h a r a c t e r -
i z e d i n that one or more transmission power control command
components representing one or more frequencies greater than
10 the oscillation frequency of the oscillations in the
corresponding transmission power level are filtered out,
entirely or partially if power of frequency components above
the oscillation frequency are greater than power of frequency
components below, and that one or more transmission power
15 control command components representing one or more frequencies
essentially equal to the oscillation frequency are filtered out
essentially entirely.

45. The device according to claim 43 c h a r a c t e r -
i z e d i n that one or more transmission power control command
20 components representing one or more frequencies essentially
equal to the oscillation frequency of the oscillations in the
corresponding transmission power level are filtered out,
essentially entirely, if power of frequency components below
the oscillation frequency are greater than power of frequency
25 components above.

46. The device according to claim 42 c h a r a c t e r -
i z e d b y the processing element comprising a frequency
transformation entity and blocking being achieved by means of
canceling frequency transform coefficients of a frequency
30 transformed signal.

47. The device according to claim 42 c h a r a c t e r -
i z e d b y the processing element blocking as present one
or more frequency components below a frequency threshold.

48. The device according to claim 47 c h a r a c t e r -
5 i z e d b y the processing element blocking as present one
or more frequency components of energy larger than energy of
frequency content above the threshold.

49. The device according to claim 47 or 48 c h a r a c t e r -
i z e d i n that the frequency threshold is set equal to the
10 oscillation frequency.

50. The device according to any of claims 32-48 c h a r a c -
t e r i z e d i n that oscillation is detected by means of
frequency analysis.

51. The device according to any of claims 32-48 c h a r a c -
15 t e r i z e d i n that loop delay is estimated in relation
to oscillation cycle time.

52. The device according to claim 51 c h a r a c t e r -
i z e d i n that loop delay is estimated to be essentially
equal to one fourth of the cycle time.

20 53. The device according to any of claims 32-48 c h a r a c -
t e r i z e d i n that it compensates for an identified
oscillation until number of identical transmission power
control commands of the established transmission power control
command sequence exceeds a threshold.

25 54. The device according to claim 53 c h a r a c t e r -
i z e d i n that the threshold corresponds to essentially four
times the loop delay.

55. The device according to any of claims 32-48 c h a r a c -
t e r i z e d i n that oscillations of one or more radio links,

for which transmission power level and cell interference are correlated to a greater extent than indicated by a predefined threshold, are compensated for.

56. The device according to any of claims 32-48 c h a r a c -
5 t e r i z e d i n that it is a device of a receiver, being
destined for the power controlled transmissions.

57. The device according to claim 56 c h a r a c t e r -
i z e d i n that the receiver is a radio base station, or is
included in or connected to a radio base station.

10 58. The device according to claim 56 c h a r a c t e r -
i z e d i n that the receiver is a mobile station, or is
included in or connected to a mobile station.

59. The device according to any of claims 32-48 c h a r a c -
t e r i z e d i n that it is a device of a transmitter, sending
15 the power controlled transmissions.

60. The device according to claim 59 c h a r a c t e r -
i z e d b y the transmitter oscillation compensating means
compensating for oscillations in received respective
transmission power control commands of different mobile
20 stations adjusted for its peak transmission power capacity.

61. The device according to claim 59 c h a r a c t e r -
i z e d i n that the transmitter is a radio base station, or
is included in or connected to a radio base station.

62. The device according to claim 59 c h a r a c t e r -
25 i z e d i n that the transmitter is a mobile station, or is
included in or connected to a mobile station.

63. Radio communication system c h a r a c t e r i z e d b y
means for carrying out the method in any of claims 1-27.

64. Radio communication system characterized by
a plurality of devices in any of claims 32-62.